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COMPARISON OF ANTI BACTERIAL EFFICACY OF PHOTODYNAMIC THERAPY AND DOXYCYCLINE ON AGGREGATIBACTER ACTINOMYCETEMCOMITANS

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Abstract

Background: *Aggregatibacter actinomycetemcomitans* (*A.actinomycetemcomitans*) is an anaerobic bacterium has been frequently associated with aggressive periodontitis. Photodynamic therapy (PDT) is a medical treatment to prevent infection progression that utilizes light to activate a photosensitizing agent. Doxycycline is an antibacterial having photosensitivity. This study aimed to evaluate potential doxycycline as an antibacterial and photosensitizer combine PDT against *A.actinomycetemcomitans* bacteria.
Material and methods: Samples were distributed to 4 groups as follow: (1) Groups A treated with a diode laser, (2) Group B treated with doxycycline 0,1% and laser, (3) Group C treated only with Doxycycline 0.1%, and (4) Group D no exposure doxycycline/laser. Data were analyzed by one-way ANOVA and Tukey's HSD test at 5% significance level.
Results: In this study, doxycycline 0.1% has the effect of reducing the bacterial viability of (59.60±3.26%). Whereas laser exposure 120 s combined with doxycycline produce the effect of bacterial viability reduction (88.50±2.83%) is not significantly different from the effect of laser 120 s exposure (88.79±2.60%). In clinical treatment, the application of laser exposure is generally at the duration of the exposure time of 30 s. The results of this study indicate that the duration of laser exposure 30 s shows a reduction in bacterial viability (44.91±1.69%) equal to the laser and with a combination of doxycycline and laser exposure (70.70±2.43%). So at low doses of laser exposure, doxycycline 0.1% combined with the laser results in the greatest reduction in bacterial viability, significantly different from laser exposure alone.
Conclusion: at low doses of laser exposure (30s with energy 3.68 J/cm^2), doxycycline 0.1% combined with the laser results in the greatest reduction in bacterial viability, significantly different with laser exposure alone.

Keywords: Photodynamic therapy, doxycycline, *Aggregatibacter actinomycetemcomitans*

Introduction

Aggressive periodontitis is an infectious disease its association rapidly progressing. These patients require treatment to prevent further progression of the disease and tissue damage. *Aggregatibacter actinomycetemcomitans* (*A.actinomycetemcomitans*) has an important key to the development of aggressive periodontitis (Lai *et al.*, 2013). *A. actinomycetemcomitans*has several virulence factors to invade epithelial cells, resisting phagocytosis, and produce leukotoxin and cytolethal descending toxin (Curtis *et al.*, 2011)

Scaling and root planning has been regarded as a standard treatment for periodontitis. However, the treatments cannot produce clinical improvement, especially in cases of advanced disease and periodontal pockets inside, due to no considerable changes in subgingival microbial composition and they do not have to target specific bacterial species. *Actinomyces* species was the first bacteria that colonized after scaling and root planning procedure, then continuing by higher numbers and a larger proportion of pathogenic bacteria from red and orange group bacteria by slower recolonization (Brayton *et al.*, 2002). Mechanical debridement leaves a large number of pathogenic microorganisms in relatively inaccessible areas, and cause a disturbance on subgingival flora.

Treatment of periodontitis using local antibiotics was intended as an adjunct to non-surgical treatment and to kill pathogenic bacteria from subgingival and extra crevicular niches. Various methods used as antimicrobial agents include rinsing, irrigation, systemic administration, and local applications using the sustained and controlled delivery